AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (currently amended): An optical power control apparatus comprising:

a multiplexer for multiplexing two or more optical signals having different wavelengths;

an optical signal transmitting section including a plurality of channels for transmitting optical signals each having a different wavelength, respectively, to the multiplexer, which allows at least part of each optical signal to leak into a channel for an optical signal having another wavelength in at least part of the channels;

~~an~~ a first optical signal transmission detector for detecting the presence or absence of an optical signal~~s~~ transmitted through a channel based on a determination of whether a power of the optical signal in the channel is equal to or lower than a first no-signal criterion level;

~~their respective proper channels included in the optical signal transmitting section; and~~

switches set in the channels of the optical signal transmitting section, respectively, for shutting down the channel ~~where~~ if the absence of an ~~no~~ optical signal transmission has been detected by the first optical signal transmission detector; and

a second optical signal transmission detector for detecting, if the first optical signal transmission detector detects the presence of the optical signal, whether an attenuator for attenuating the optical signal in the channel is faulty based on a determination of whether a power of the optical signal in the channel is equal to or lower than a second no-signal criterion level.

2. (canceled).

3. (currently amended): An optical power control apparatus comprising:

a demultiplexer which receives a multiplexed optical signal obtained by multiplexing optical signals having different wavelengths, one channel being allocated for each, and demultiplexes the multiplexed optical signal into the optical signals having different wavelengths corresponding to the respective channels;

demultiplexed signal level detectors set in the channels, respectively, for detecting the power levels of the optical signals;

~~an~~ first optical signal detector for deciding whether or not the power level of each optical signal detected by the demultiplexed signal level detector set in each channel is lower than a first criterion level which is the lowest level of ~~an~~ a received optical signal to detect optical signal input with respect to each channel;

a second optical signal detector for deciding whether or not an attenuator associated with each optical signal is faulty based on whether or not the power level of each optical signal is lower than a second criterion level;

switches set in the channels, respectively, for passing or stopping the input optical signals of the respective channels demultiplexed by the demultiplexer;

a multiplexer for multiplexing the optical signals of the respective channels, which have passed through the switches; and

a switch controller which controls the respective switches so as to shut down the channel where no optical signal input has been detected by the first optical signal detector.

4. (canceled).

5. (original): An optical power control apparatus comprising:

a demultiplexer which receives a multiplexed optical signal obtained by multiplexing optical signals having different wavelengths, one channel being allocated for each, and demultiplexes the multiplexed optical signal into the optical signals having different wavelengths corresponding to the respective channels;

a spectrum analyzer for analyzing the spectrum of the multiplexed optical signal before being demultiplexed by the demultiplexer;

a wavelength-specific signal level detector for detecting the power levels of the optical signals of the respective channels based on the analysis result obtained by the spectrum analyzer;

an optical signal detector for deciding whether or not the power level of the optical signal detected by the wavelength-specific signal level detector with respect to each wavelength is lower than the lowest level of an received optical signal to detect optical signal input in each channel;

switches set in the channels, respectively, for passing or stopping the input optical signals of the respective channels demultiplexed by the demultiplexer;

a multiplexer for multiplexing the optical signals of the respective channels, which have passed through the switches; and

a switch controller which controls the respective switches so as to shut down the channel where no optical signal input has been detected by the optical signal detector.

6. (previously presented): An optical power control apparatus comprising:

a demultiplexer which receives a multiplexed optical signal obtained by multiplexing optical signals having different wavelengths, one channel being allocated for each wavelength, and demultiplexes the multiplexed optical signal into optical signals having different wavelengths corresponding to the respective channels;

a spectrum analyzer for analyzing a spectrum of the multiplexed optical signal before being demultiplexed by the demultiplexer;

a wavelength-specific signal level detector for detecting power levels of the optical signals of the respective channels based on the spectrum obtained by the spectrum analyzer;

an optical signal detector for deciding whether or not the power level of the optical signal detected by the wavelength-specific signal level detector with respect to each wavelength is lower than the lowest level of a received optical signal to detect optical signal input in each channel;

signal level adjusting sections set in the channels, respectively, for adjusting the power levels of the optical signals of the respective channels demultiplexed by the demultiplexer;

a multiplexer for multiplexing the optical signals of the respective channels, which have passed through the signal level adjusting sections; and

a signal level adjusting section controller which controls the respective signal level adjusting sections so as to attenuate the power level of the optical signal of a channel where no optical signal input has been detected by the optical signal detector to the greatest extent possible.

7. (original): An optical power control apparatus comprising:

a demultiplexer which receives a multiplexed optical signal obtained by multiplexing optical signals having different wavelengths, one channel being allocated for each, and demultiplexes the multiplexed optical signal into the optical signals having different wavelengths corresponding to the respective channels;

a supervisory signal receiver for receiving a supervisory signal indicating whether there is transmission of at least part of the optical signals of the respective channels which form the multiplexed optical signal input to the demultiplexer;

switches set in the channels, respectively, for passing or stopping the input optical signals of the respective channels demultiplexed by the demultiplexer;

a multiplexer for multiplexing the optical signals of the respective channels, which have passed through the switches; and

a switch controller which controls the respective switches so as to shut down each channel when the supervisory signal receiver has determined that no optical signal was transmitted to the channel.

8. (previously presented): An optical power control apparatus comprising:

a demultiplexer which receives a multiplexed optical signal obtained by multiplexing optical signals having different wavelengths, one channel being allocated for each wavelength, and demultiplexes the multiplexed optical signal into optical signals having different wavelengths corresponding to the respective channels;

a supervisory signal receiver for receiving a supervisory signal indicating whether there is transmission of at least part of the optical signals of the respective channels which form the multiplexed optical signal input to the demultiplexer;

signal level adjusting sections set in the channels, respectively, for adjusting power levels of the optical signals of the respective channels demultiplexed by the demultiplexer;

a multiplexer for multiplexing the optical signals of the respective channels, which have passed through the signal level adjusting sections; and

a signal level adjusting section controller which controls the respective signal level adjusting sections so as to attenuate the power level of the optical signal of a channel to the greatest extent possible when the supervisory signal receiver has determined that no optical signal was transmitted to the channel.

9. (canceled).

10. (original): The optical power control apparatus claimed in claim 6, wherein each of the signal level adjusting sections includes:

a signal level adjuster capable of increasing the insertion loss to such level that an input optical signal is substantially shut off;

an adjusted signal level detector for detecting the power level of the optical signal which has passed through the signal level adjuster; and

a signal level adjustment controller for controlling the adjustment of signal level performed by the signal level adjuster so that the power level of each optical signal detected by the adjusted signal level detector becomes a prescribed value.

11. (original): The optical power control apparatus claimed in claim 8, wherein each of the signal level adjusting sections includes:

a signal level adjuster capable of increasing the insertion loss to such level that an input optical signal is substantially shut off;

an adjusted signal level detector for detecting the power level of the optical signal which has passed through the signal level adjuster; and

a signal level adjustment controller for controlling the adjustment of signal level performed by the signal level adjuster so that the power level of each optical signal detected by the adjusted signal level detector becomes a prescribed value.

12. (canceled).

13. (original): The optical power control apparatus claimed in claim 6, wherein each of the signal level adjusting sections includes:

an attenuator capable of increasing the insertion loss to such level that an input optical signal is substantially shut off;

an attenuated signal level detector for detecting the power level of the optical signal which has passed through the attenuator; and

an insertion loss controller for controlling the amount of the insertion loss to be increased by the attenuator so that the power level of each optical signal detected by the attenuated signal level detector becomes a prescribed value.

14. (original): The optical power control apparatus claimed in claim 8, wherein each of the signal level adjusting sections includes:

an attenuator capable of increasing the insertion loss to such level that an input optical signal is substantially shut off;

an attenuated signal level detector for detecting the power level of the optical signal which has passed through the attenuator; and

an insertion loss controller for controlling the amount of the insertion loss to be increased by the attenuator so that the power level of each optical signal detected by the attenuated signal level detector becomes a prescribed value.

15. (original): The optical power control apparatus claimed in claim 3, wherein the demultiplexer and the multiplexer are formed of arrayed waveguide gratings, respectively.

16. (canceled).

17. (original): The optical power control apparatus claimed in claim 5, wherein the demultiplexer and the multiplexer are formed of arrayed waveguide gratings, respectively.

18. (previously presented): The optical power control apparatus claimed in claim 6, wherein each of the demultiplexer and the multiplexer is formed of an arrayed waveguide grating.

19. (original): The optical power control apparatus claimed in claim 7, wherein the demultiplexer and the multiplexer are formed of arrayed waveguide gratings, respectively.

20. (previously presented): The optical power control apparatus claimed in claim 8, wherein each of the demultiplexer and the multiplexer is formed of an arrayed waveguide grating.

21. (original): The optical power control apparatus claimed in claim 7, wherein the supervisory signal receiver is an OSC (Optical Server Channel) terminator that terminates an OSC signal.

22. (original): The optical power control apparatus claimed in claim 8, wherein the supervisory signal receiver is an OSC (Optical Server Channel) terminator that terminates an OSC signal.

23. (canceled).

24. (currently amended): An optical power control method comprising:

~~an~~ <u>a first</u> optical signal transmission detecting step for detecting the presence or absence of optical signals<u>, received at an optical intermediate node, each of the optical signals having a different wavelength,</u> transmitted through their respective proper channels with respect to each of a plurality of channels for transmitting optical signals each having a different wavelength, respectively, to the same multiplexer<u> in the optical intermediate node</u>, in at least part of which at

least part of each optical signal leaks into a channel allocated for an optical signal having another wavelength, wherein the first optical signal transmission detecting step comprises detecting the presence or absence of optical signals based on whether power levels of the optical signals are equal to or lower than a first criterion level;

a second optical signal transmission detecting step of detecting whether or not attenuators associated with the optical signals are faulty based on whether power levels of the optical signals are equal to or lower than a second criterion level; and

a shutting down step for shutting down the channel where no proper optical signal transmission was detected at the optical signal transmission detecting step, such that the shut-down channel does not reach the multiplexer of the optical intermediate node.

25. (canceled).

26. (currently amended): An optical power control method comprising:

a demultiplexing step for receiving, at an optical interconnect node, a multiplexed optical signal obtained by multiplexing optical signals having different wavelengths, one channel being allocated for each, and a demultiplexer of the optical interconnect node demultiplexing the multiplexed optical signal into the optical signals having different wavelengths corresponding to the respective channels;

a first demultiplexed signal level detecting step for detecting, at the optical interconnect node, the power levels of the optical signals of the respective channels demultiplexed at the demultiplexing step;

~~an~~ a first optical signal detecting step for deciding, at a controller of the optical interconnect node, whether or not the power level of each optical signal detected at the first demultiplexed signal level detecting step is lower than a first criterion level which is the lowest level of an received optical signal to detect optical signal input with respect to each channel;

a switching step for receiving the optical signals of the respective channels demultiplexed at the demultiplexing step, and the controller of the optical interconnect node controlling a blocking of the passage of the optical signal of the channel where no optical signal input was detected at the first optical signal detecting step;

a second demultiplexed signal level detecting step for detecting, at the optical interconnect node, the power levels of the optical signals of the respective channels;

a second optical signal detecting step for deciding, at a controller of the optical interconnect node, whether or not an attenuator associated with each optical signal is faulty based on whether or not the power level of each optical signal detected at the second demultiplexed signal level detecting step is lower than a second criterion level; and

a multiplexing step for multiplexing, at a multiplexer of the optical interconnect node, the optical signals of the respective channels, whose passage was allowed at the switching step.

27. (canceled).

28. (currently amended): An optical power control method comprising:

a demultiplexing step for receiving, at an optical interconnect node, a multiplexed optical signal obtained by multiplexing optical signals having different wavelengths, one channel being allocated for each, and for a demultiplexer of the optical interconnect node demultiplexing the

multiplexed optical signal into the optical signals having different wavelengths corresponding to the respective channels;

a spectrum analyzing step for analyzing the spectrum of the multiplexed optical signal before being demultiplexed at the demultiplexing step;

a wavelength-specific signal level detecting step for detecting, at the optical interconnect node, the power levels of the optical signals of the respective channels based on the analysis result obtained at the spectrum analyzing step;

an optical signal detecting step for deciding, at a controller of the optical interconnect node, whether or not the power level of the optical signal detected at the wavelength-specific signal level detecting step with respect to each wavelength is lower than the lowest level of an received optical signal to detect optical signal input in each channel;

a switching step for receiving the optical signals of the respective channels demultiplexed at the demultiplexing step, and for the controller of the optical interconnect node controlling a blocking of the passage of the optical signal of the channel where no optical signal input was detected at the optical signal detecting step; and

a multiplexing step for a multiplexer of the optical interconnect node multiplexing the optical signals of the respective channels, whose passage was allowed at the switching step.

29. (currently amended): An optical power control method comprising:

a demultiplexing step for receiving, at an optical interconnect node, a multiplexed optical signal obtained by multiplexing optical signals having different wavelengths, one channel being allocated for each, and a demultiplexer of the optical interconnect node demultiplexing the

multiplexed optical signal into the optical signals having different wavelengths corresponding to the respective channels;

a spectrum analyzing step for analyzing a spectrum of the multiplexed optical signal before being demultiplexed at the demultiplexing step;

a wavelength-specific signal level detecting step for detecting, at the optical interconnect node, power levels of the optical signals of the respective channels based on the analysis result obtained at the spectrum analyzing step;

an optical signal detecting step for a controller of the optical interconnect node deciding whether or not the power level of the optical signal detected at the wavelength-specific signal level detecting step with respect to each wavelength is lower than the lowest level of a received optical signal to detect optical signal input in each channel;

a signal level adjusting step for receiving the optical signals of the respective channels demultiplexed at the demultiplexing step, and for the controller adjusting the signal level so as to attenuate the power level of the optical signal of the channel where no optical signal input was detected at the optical signal detecting step to the greatest extent possible; and

a multiplexing step for multiplexing, at a multiplexer of the optical interconnect node, the optical signals of the respective channels which have undergone the signal level adjusting step.

30. (currently amended): An optical power control method comprising:

a demultiplexing step for receiving, at an optical interconnect node, a multiplexed optical signal obtained by multiplexing optical signals having different wavelengths, one channel being allocated for each, and for a demultiplexer of the optical interconnect node demultiplexing the

multiplexed optical signal into the optical signals having different wavelengths corresponding to the respective channels;

a supervisory signal receiving step for receiving, at the optical interconnected node, a supervisory signal indicating whether there is transmission of at least part of the optical signals of the respective channels which form the multiplexed optical signal input at the demultiplexing step;

a switching step for receiving the optical signals of the respective channels demultiplexed at the demultiplexing step, and for a controller of the optical interconnect node blocking the passage of the optical signal of the channel where no optical signal input was detected at the supervisory signal receiving step; and

a multiplexing step for multiplexing, at a multiplexer of the optical interconnect node, the optical signals of the respective channels, whose passage was allowed at the switching step.

31. (currently amended): An optical power control method comprising:

a demultiplexing step for receiving, at an optical interconnect node, a multiplexed optical signal obtained by multiplexing optical signals having different wavelengths, one channel being allocated for each, and for a demultiplexer of the optical interconnect node demultiplexing the multiplexed optical signal into the optical signals having different wavelengths corresponding to the respective channels;

a supervisory signal receiving step for receiving, at the optical interconnect node, a supervisory signal indicating whether there is transmission of at least part of the optical signals of the respective channels which form the multiplexed optical signal input at the demultiplexing step;

a signal level adjusting step for receiving the optical signals of the respective channels demultiplexed at the demultiplexing step, and for a controller of the optical interconnect node adjusting the signal level so as to attenuate the power level of the optical signal of the channel where no optical signal input was detected at the supervisory signal receiving step to the greatest extent possible; and

a multiplexing step for multiplexing, at a multiplexer of the optical interconnect node, the optical signals of the respective channels which have undergone the signal level adjusting step.

32. (canceled).

33. (currently amended): A computer-readable medium having ~~An~~ an optical power control program stored thereon, the program enabling the ~~for controlling a~~ computer to perform:

~~an~~ a first optical signal transmission detecting process for detecting the presence or absence of optical signals transmitted through their respective proper channels with respect to each of a plurality of channels for transmitting optical signals each having a different wavelength, respectively, to the same multiplexer, in at least part of which at least part of each optical signal leaks into a channel allocated for an optical signal having another wavelength, wherein the first optical signal transmission detecting process comprises detecting the presence or absence of optical signals based on whether power levels of the optical signals are equal to or lower than a first criterion level;

a second optical signal transmission detecting process of detecting whether or not attenuators associated with the optical signals are faulty based on whether power levels of the optical signals are equal to or lower than a second criterion level; and

a shutting down process for shutting down the channel where no proper optical signal transmission has been detected by the first optical signal transmission detecting process.

34. (canceled).

35. (currently amended): A computer-readable medium having ~~An~~ an optical power control program stored thereon, for controlling a computer of an intermediary device comprising a demultiplexer which receives a multiplexed optical signal obtained by multiplexing optical signals having different wavelengths, one channel being allocated for each, to demultiplex the multiplexed optical signal, and a multiplexer which receives the optical signals of the respective channels demultiplexed by the demultiplexer to multiplex the optical signals after their power levels have been adjusted, respectively, to perform:

a first demultiplexed signal level detecting process for detecting the power levels of the optical signals of the respective channels demultiplexed by the demultiplexer;

a first ~~an~~ optical signal detecting process for deciding whether or not the power level of each optical signal detected by the first demultiplexed signal level detecting process is lower than a first criterion level which is the lowest level of an received optical signal to detect optical signal input with respect to each channel; ~~and~~

a switching process for receiving the optical signals of the respective channels demultiplexed by the demultiplexing process, and preventing the optical signal of the channel where no optical signal input has been detected by the first optical signal detecting process from being input in the multiplexer;

a second demultiplexed signal level detecting process for detecting the power levels of the optical signals of the respective channels; and

a second optical signal detecting process for deciding whether or not an attenuator associated with each optical signal is faulty based on whether or not the power level of each optical signal detected by the second demultiplexed signal level detecting process is lower than a second criterion level.

36. (canceled).

37. (currently amended): A computer-readable medium having an ~~An~~ optical power control program stored thereon for controlling a computer of an intermediary device comprising a demultiplexer which receives a multiplexed optical signal obtained by multiplexing optical signals having different wavelengths, one channel being allocated for each, to demultiplex the multiplexed optical signal, and a multiplexer which receives the optical signals of the respective channels demultiplexed by the demultiplexer to multiplex the optical signals after their power levels have been adjusted, respectively, to perform:

a spectrum analyzing process for analyzing the spectrum of the multiplexed optical signal before being demultiplexed by the demultiplexer;

a wavelength-specific signal level detecting process for detecting the power levels of the optical signals of the respective channels based on the analysis result obtained by the spectrum analyzing process;

an optical signal detecting process for deciding whether or not the power level of the optical signal detected by the wavelength-specific signal level detecting process with respect to

each wavelength is lower than the lowest level of an received optical signal to detect optical signal input in each channel; and

a switching process for receiving the optical signals of the respective channels demultiplexed by the demultiplexer, and preventing the optical signal of the channel where no optical signal input has been detected by the optical signal detecting process from being input in the multiplexer.

38. (previously presented): An optical power control program, recorded on a computer readable medium, for controlling a computer of an intermediary device comprising a demultiplexer which receives a multiplexed optical signal obtained by multiplexing optical signals having different wavelengths, one channel being allocated for each, to demultiplex the multiplexed optical signal, and a multiplexer which receives the optical signals of the respective channels demultiplexed by the demultiplexer to multiplex the optical signals after their power levels have been adjusted, respectively, to perform:

a spectrum analyzing process for analyzing a spectrum of the multiplexed optical signal before being demultiplexed by the demultiplexer;

a wavelength-specific signal level detecting process for detecting the power levels of the optical signals of the respective channels based on the spectrum obtained by the spectrum analyzing process;

an optical signal detecting process for deciding whether or not the power level of the optical signal detected by the wavelength-specific signal level detecting process with respect to each wavelength is lower than the lowest level of a received optical signal to detect optical signal input in each channel; and

a signal level adjusting process for adjusting the signal level so as to attenuate the power level of the optical signal of the channel where no optical signal input is detected by the optical signal detecting process to the greatest extent possible before inputting the optical signal in the multiplexer.

39. (currently amended): A computer-readable medium having an ~~An~~ optical power control program stored thereon for controlling a computer of an intermediary device comprising a demultiplexer which receives a multiplexed optical signal obtained by multiplexing optical signals having different wavelengths, one channel being allocated for each, to demultiplex the multiplexed optical signal, and a multiplexer which receives the optical signals of the respective channels demultiplexed by the demultiplexer to multiplex the optical signals after their power levels have been adjusted, respectively, to perform:

a supervisory signal receiving process for receiving a supervisory signal indicating whether there is transmission of at least part of the optical signals of the respective channels which form the multiplexed optical signal input to the demultiplexer; and

a switching process for preventing the optical signal of each channel from being input in the multiplexer when it has been determined that no optical signal was transmitted to the channel by the supervisory signal receiving process.

40. (previously presented): An optical power control program, recorded on a computer readable medium, for controlling a computer of an intermediary device comprising a demultiplexer which receives a multiplexed optical signal obtained by multiplexing optical signals having different wavelengths, one channel being allocated for each, to demultiplex the

multiplexed optical signal, and a multiplexer which receives the optical signals of the respective channels demultiplexed by the demultiplexer to multiplex the optical signals after their power levels have been adjusted, respectively, to perform:

a supervisory signal receiving process for receiving a supervisory signal indicating whether there is transmission of at least part of the optical signals of the respective channels which form the multiplexed optical signal input to the demultiplexer; and

a signal level adjusting process for adjusting the signal level so as to attenuate the power level of the optical signal of each channel to the greatest extent possible when it has been determined that no optical signal was transmitted to the channel by the supervisory signal receiving process.

41. (canceled).